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RUBBER IN THE SINO-SOVIET BLOC

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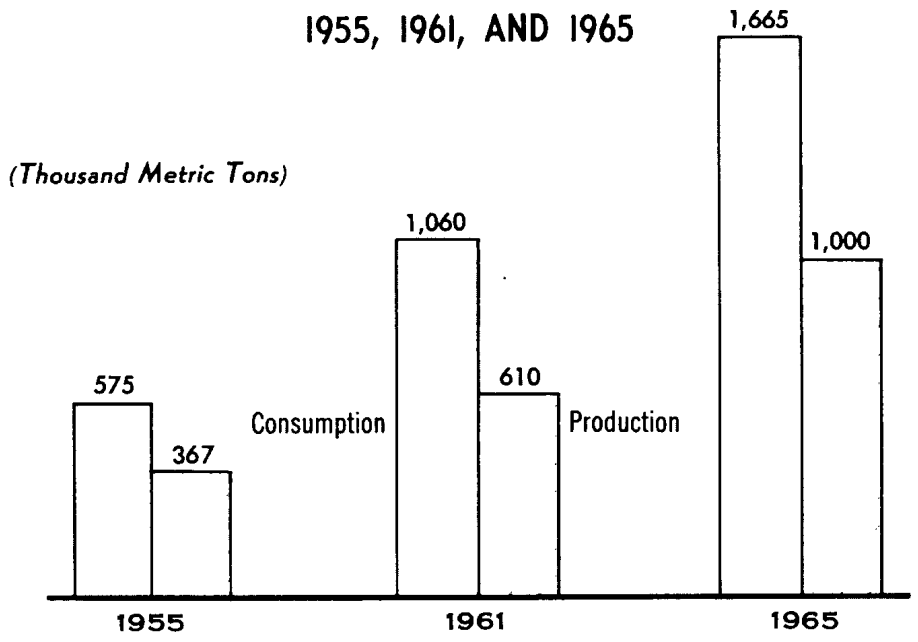
RUBBER IN THE SINO-SOVIET BLOC*

Summary and Conclusions

Since 1955 the rubber situation in the Sino-Soviet Bloc has been characterized by increasing reliance on imports of rubber, a condition that probably will persist through 1965. As shown in the accompanying chart, the gap between consumption and production of rubber has widened

ESTIMATED CONSUMPTION AND PRODUCTION OF RUBBER* BY THE SINO-SOVIET BLOC 1955, 1961, AND 1965



*Natural, synthetic, and reclaimed rubber

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from about 210,000 tons** in 1955 to about 450,000 tons in 1961 and may reach 665,000 tons by 1965. Whether or not this pressure for increased

* The estimates and conclusions in this report represent the best judgment of this Office as of 15 October 1962.

** Tonnages are given in metric tons throughout this report.

imports of natural rubber will extend well beyond 1965 depends to a considerable extent on the future success of the Bloc in creating new capacity for production of synthetic rubber. In particular, demand for imports will be related to the ability of the Bloc to overcome technical problems and related difficulties in construction and to achieve goals for production of stereo-regular rubbers, which duplicate or nearly duplicate the properties of natural rubber.

In spite of many difficulties, production of rubber by the Bloc has increased significantly in recent years. A gain of about 65 percent has taken place since 1955, with output in 1961 estimated at 610,000 tons -- 520,000 tons of synthetic rubber and 90,000 tons of reclaimed rubber.* Although output of synthetic rubber by the Bloc has increased, this output is still about one-third of that in the US and is confined mainly to three countries, with the USSR producing about three-fourths of the total.

Confronted with difficulties in planning, technology, and construction, the Bloc probably will underfulfill its goal for production of synthetic rubber in 1965 of about 1.1 million tons but may attain an output of between 830,000 and 850,000 tons. Shortfalls in 1965 are estimated to include important Soviet plans for production of stereo-regular rubber.

To keep pace with the increased demand for rubber, the Bloc has been forced to supplement production by large imports. These imports, consisting mainly of natural rubber, have increased more than threefold since 1955, reaching the record level of about 580,000 tons in 1961. Although purchases in 1961 were exceptionally high, partly because of Soviet efforts to replenish inventories, large imports of rubber by the Bloc are expected to continue and to reach 600,000 to 700,000 tons by 1965. Imports of natural rubber are obtained largely from Malaya, with Indonesia replacing Ceylon in recent years as the second most important supplier, possibly because of the political aims of the Bloc as well as economic considerations.

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* Reclaimed rubber is expressed throughout this report in terms of "new rubber" equivalents; in the manufacture of new rubber products, about 2 tons of reclaimed rubber are equivalent to 1 ton of new rubber.

I. Consumption, 1955-61

Since 1955, consumption of rubber by the Bloc has nearly doubled, reaching an estimated consumption of 1.1 million tons in 1961. This increase was greater than that experienced by the Free World, consumption by the Bloc rising from about 16 percent of the world total in 1955 to about 22 percent in 1961, as shown in Table 1. A major factor in the increased use of rubber by the Bloc has been the effort to overcome shortages in rubber tires and to keep pace with the expanding needs of transportation. It is estimated that output of motor vehicle tires nearly doubled between 1955 and 1961 and consumed about 60 percent of all rubber used in 1961.

Table 1

Estimated Consumption of Rubber
by the Sino-Soviet Bloc a/ and the Free World b/
1955 and 1961

Area	1955		1961	
	Thousand Metric Tons	Percent of World Total	Thousand Metric Tons	Percent of World Total
Sino-Soviet Bloc	575	16	1,060	22
USSR	375	11	700	15
European Satellites	150	4	260	5
Communist China and North Korea	50	1	100	2
US	1,713	46	1,680	35
Rest of the Free World	1,419	38	2,033	43
World total	3,707	100	4,773	100

a. Including natural, synthetic, and reclaimed rubber. For the methodology, see Appendix B.

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The ratio of synthetic to natural rubber consumed by the Bloc in 1961 was about 1 to 1,* somewhat lower than the ratio in 1955. This ratio reflects the failure of the Bloc to install and operate enough new capacity for production of synthetic rubber to keep pace with the growing requirements for all rubber.

The USSR is by far the largest consumer of rubber in the Bloc and ranks second in consumption in the world after the US. The 700,000 tons consumed by the USSR in 1961 amounted to about two-thirds of the estimated total consumption by the Bloc and was more than double the amount consumed by any of the major Western European countries or Japan. 3/

II. Production, 1955-61

In an effort to meet rapidly rising requirements, the Bloc has increased its production of rubber substantially in recent years. Since 1955, output has increased about 65 percent, reaching an estimated total of 610,000 tons in 1961. The major component of this expansion was synthetic rubber, production of which increased at an average annual rate of 9 percent. Of the total production of rubber in 1961, about 520,000 tons, or 85 percent, was synthetic, and the remainder was reclaimed. Some natural rubber is grown in Communist China and North Vietnam, but the amounts are insignificant.

Although gains in production of synthetic rubber by the Bloc have been well above the world average in recent years, output in 1961 was about one-third of that in the US and was confined almost entirely to only three countries -- the USSR, East Germany, and Poland. The estimated production of synthetic and reclaimed rubber by the Bloc and the Free World in 1955 and 1961 is given in Table 2.**

The USSR is both the major producer and the center of technical development of synthetic rubber in the Bloc. The USSR had 10 plants in operation in 1961, with output estimated at 400,000 tons of synthetic rubber, about three-fourths of the total output by the Bloc. Moreover, the USSR was the only country of the Bloc producing the new stereo-regular synthetic rubbers in 1961. In December the USSR announced "initial" production of polybutadiene, 4/ polyisoprene having been produced previously on an experimental basis.***

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* The corresponding ratio in the US in 1961 was about 2.5 to 1. 2/

** Table 2 follows on p. 5.

*** Cis-polybutadiene and cis-polyisoprene. These recently developed synthetic rubbers are referred to as "stereo-regular" or "stereo-specific" because their molecular chains have a definite and specific spatial arrangement. Cis-polyisoprene is identical with natural rubber in molecular structure, and cis-polybutadiene is very similar, a fact that explains why they are often called "synthetic natural" rubbers.

Table 2

Estimated Production of Synthetic and Reclaimed Rubber by the Sino-Soviet Bloc and the Free World 1955 and 1961

Thousand Metric Tons

Area	1955 Total	1955 Synthetic	1955 Reclaimed a/	1961 Total	1961 Synthetic	1961 Reclaimed a/
Sino-Soviet Bloc	367	312	55	610	520	90
USSR	275	240	35	460	400	60
European Satellites	87	72	15	142	120	22
Bulgaria	1	0	1	1	0	1
Czechoslovakia	6	1	5	8	1	7
East Germany	74	71	3	93	88	5
Hungary	3	0	3	3	0	3
Poland	2	0	2	36	31	5
Rumania	1	0	1	1	0	1
Communist China	5	0	5	8	Negl.	8
US	1,152	986	166	1,559	1,427	132
Rest of the Free World	166	117	49	626	567	59
World total	1,685	1,415	270	2,795	2,514	281

a. Reclaimed rubber is expressed in terms of "new rubber" equivalents; in the manufacture of new rubber products, about 2 tons of reclaimed rubber are equivalent to 1 ton of new rubber.

Although the USSR leads the Bloc in development and production of synthetic rubber, progress by US standards has not been noteworthy. Production of synthetic rubber relative to the total rubber consumed is low compared with that in the US; much of the processing is carried out by high-cost, outmoded methods; and about half of the current production by the USSR consists of sodium butadiene polymer, an inferior and obsolescent type of synthetic rubber. In general, faulty planning, inadequate technology, and lagging construction have plagued Soviet efforts to increase the quantity, improve the quality, and lower the cost of synthetic rubber.*

East Germany, the second largest producer of synthetic rubber in the Bloc, had an output in 1961 of 88,140 tons, 6/ most of which was styrene-butadiene copolymers. All production by East Germany takes place at the Buna Werke in Schkopau.

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Poland produced 31,000 tons of synthetic rubber in 1961, 7/ all of which was the styrene-butadiene type. The quality of the synthetic rubber produced by Poland reportedly is inferior to that produced by the West. 8/ Most of the Polish output, which began in 1959 at Oswiecim, is produced by obsolete, uneconomical processes obtained from East Germany and the USSR.

Elsewhere in the Bloc the amount of synthetic rubber produced is insignificant. Czechoslovakia produces special-purpose chloroprene rubber, but production has not yet advanced beyond the pilot-plant level of about 1,000 tons per year. In Communist China, limited production of styrene-butadiene rubber reportedly began in 1960, with two plants said to be under construction. The extent of the progress on these projects since the withdrawal of Soviet assistance is not known but presumably has not been great. The location and products of the synthetic rubber plants in the Bloc, including plants under construction and planned as well as those in operation, are given in Appendix A.

III. Foreign Trade, 1950-61

The inadequate production of rubber relative to the demand has forced the Bloc to maintain a high level of imports. Imports in 1961 amounted to about 580,000 tons, about 30 percent more than in 1960 and substantially above the previous peak of 470,000 tons in 1959. Sharply increased imports by the USSR in 1961 more than offset a decline in imports by Communist China. More than nine-tenths of the rubber imported is natural rubber, although imports of synthetic rubber have been increasing rapidly. Data on imports of natural and synthetic rubber by the Bloc from 1950 to 1961 are given in Table 3.*

The USSR leads the Bloc in imports of natural rubber and is second only to the US on a worldwide basis. In 1960, according to Bloc statistics, the USSR imported 175,000 tons** of natural rubber, 9/ substantially below the net imports of about 225,000 tons in 1959. Bloc statistics are not available as yet for 1961, but data from the International Rubber Study Group indicate that net imports by the USSR will be about 300,000 tons. The stepped-up rate of net imports in 1961 apparently was caused primarily by shortcomings in production of synthetic rubber, although replacement of depleted inventories and declines in

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* Table 3 follows on p. 7.

** Net basis. The USSR obtains some of its natural rubber from the Free World through Communist China. The USSR also reexports natural rubber to the European Satellites.

Table 3

Imports of Rubber by the Sino-Soviet Bloc a/
1950-61

Thousand Metric Tons

Year	Total	Natural	Synthetic
1950	192	192	0
1951	162	162	0
1952	198	198	0
1953	167	167	0
1954	114	114	Negl.
1955	136	136	Negl.
1956	308	308	Negl.
1957	286	286	Negl.
1958	438	435	3
1959	470	454	16
1960	445	416	29
1961	578	530	48

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price* may have been contributing factors. Estimated net imports of natural rubber by the various countries of the Bloc for 1955 and 1960 are given in Table 4.**

Communist China imported about 136,000 12/ tons of natural rubber from the Free World in 1960 and reexported about 18,000 tons to other countries of the Bloc. In 1961, Chinese purchases dropped sharply to about 82,000 tons, 13/ reflecting the general decline in Chinese economic activity and shortages of foreign exchange.

The European Satellites imported 143,000 tons of natural rubber in 1960, more than double the imports in 1955. Czechoslovakia is the largest importer of natural rubber in the European Satellites, with imports of 63,000 tons in 1960. 14/ Next in order of importance are Poland and East Germany, with imports of 35,000 15/ and 23,000 tons, 16/ respectively, in the same year.

* The average New York price of natural rubber per pound dropped from 38.16 cents in 1960 to 29.50 cents in 1961, a decline of almost 23 percent. 11/

** Table 4 follows on p. 8.

Table 4

Net Imports of Natural Rubber by the Sino-Soviet Bloc from the Free World a/ 1955 and 1960

Thousand Metric Tons

Area	1955	1960
Sino-Soviet Bloc	132	436
USSR	25	175
European Satellites	67	143
Albania	Negl.	Negl.
Bulgaria	1	3
Czechoslovakia	30	63
East Germany	10	23
Hungary	6	10
Poland	19	35
Rumania	1	9
Communist China	40	118

a. Net basis. Data were derived in part from official Bloc statistics and differ somewhat from data in Table 3 and data published by the International Rubber Study Group.

The major sources of natural rubber imported by the Bloc are Malaya, Indonesia, and Ceylon, with small quantities originating in Thailand, Cambodia, and other areas.* Malaya was the source for more than one-half of the imports by the Bloc of natural rubber in 1960, supplying 244,000 tons. Indonesia has become an increasingly important source, supplying one-fifth of the total in the same year. Although Ceylon continues to supply about the same quantity of rubber to the Bloc as it did in 1955, its relative importance as a source of supply has declined considerably. Imports of natural rubber by the Bloc, by source, for 1955 and 1960 are given in Table 5.**

* The Hainan Island project of Communist China may provide about 1,000 tons annually, and small quantities may come from North Vietnam, but the total from sources in the Communist Far East is insignificant in terms of the demand by the Bloc.

** Table 5 follows on p. 9.

Table 5

Estimated Sources of Natural Rubber
in the Sino-Soviet Bloc a/
1955 and 1960

Thousand Metric Tons

	1955	1960
Total	132	436
Malaya	51	244
Indonesia	22	89
Ceylon	51	49
Thailand	0	4
Cambodia	0	3
Unspecified	8	47

a. Data were derived from official Bloc statistics and from data published by the International Rubber Study Group.

Imports of synthetic rubber by the Bloc, which were negligible between 1954 and 1958, have been growing rapidly and now have assumed some significance. Of the total imports of 48,500 tons in 1961, about 26,000 tons went to the USSR, 13,500 to Communist China, and 9,000 to Eastern Europe. 17/ The exporting countries include Italy, the US, the UK, West Germany, and Japan.

IV. Prospects

A. Through 1965

The demand for rubber by the Bloc is expected to increase from about 985,000 tons in 1960 to about 1.7 million tons in 1965. In order to meet the goals for production of motor vehicle tires for 1965, it is estimated that about 950,000 tons of rubber will be required in that year. Furthermore, it is estimated that requirements for the nontransportation segment of the rubber fabricating industry of the Bloc will increase from about 425,000 tons in 1960 to about 715,000 tons in 1965. The estimated consumption of rubber by the Bloc, by country, in 1960 and 1965, is given in Table 6.*

* Table 6 follows on p. 10.

Table 6

Estimated Consumption of Rubber
by the Sino-Soviet Bloc
1960 and 1965

Thousand Metric Tons

Area	1960	1965
Sino-Soviet Bloc	985	1,665
USSR	623	1,067
European Satellites	251	421
Bulgaria	14	29
Czechoslovakia	77	104
East Germany	69	107
Hungary	22	37
Poland	55	110
Rumania	14	34
Communist China and North Korea	111	177

On the other hand, plans by the Bloc call for production of about 1.1 million tons of synthetic rubber in 1965, including about 800,000 tons by the USSR and 285,000 tons by the European Satellites. The Soviet goal calls for stereo-regular rubber to comprise about 36 percent of the production capacity of synthetic rubber by the end of 1965. Of this stereo-regular rubber capacity, 65 percent is to be polyisoprene and 35 percent is to be polybutadiene, thus implying that the USSR plans to produce substantial quantities of stereo-regular rubber in 1965, possibly 150,000 tons or more. Communist China has not released data on current production or on goals for synthetic rubber, but it is doubtful that the Chinese expect to be producing more than a few thousand tons by 1965. Although it is highly unlikely that any rubber will be produced by 1965, North Korea has announced plans to produce 15,000 to 20,000 tons 18/ by 1967.

The prospects are that production of synthetic rubber actually will fall considerably short of the goal of about 1.1 million tons in 1965. It is estimated that production by the USSR will be about 600,000 tons, with a severe shortfall in production of stereo-regular rubbers. In the European Satellites the planned increases for individual countries are generally in line with capabilities and the progress to date.

Exceptions, however, are Czechoslovakia, where lagging construction is expected to interfere with plans to attain the largest increase (from 1,000 tons in 1961 to 55,000 tons in 1965), 19/ and Bulgaria, where delays in constructing a styrene-butadiene plant at Burgas have cast serious doubt on plans to produce 30,000 tons of synthetic rubber by 1965. With allowance for these shortfalls in production, it is estimated that the European Satellites will produce about 230,000 tons of synthetic rubber by 1965. On the assumption of limited production in Communist China, output by the Bloc is estimated at 830,000 to 850,000 tons. In addition, it is estimated that production of reclaimed rubber will increase from 80,000 tons in 1960 to 150,000 tons in 1965. Thus the total production of rubber is expected to be about 1 million tons compared with requirements of about 1.7 million tons, indicating that the Bloc will need to import rubber in 1965 at an amount somewhat above the current rate of 580,000 tons. It is not possible to estimate the proportions of natural and synthetic rubber, although, as noted above, the proportion of imports in the form of synthetic rubber has been increasing.

B. After 1965

The short-run prospects are for a continuation of imports at about the current high rate, but the objective of several of the Bloc countries evidently is to reduce or eliminate imports of rubber. Soviet statements made in 1959 indicate that the USSR intends to curtail its purchases of natural rubber as soon as possible by greatly expanding production of synthetic rubber, especially stereo-regular types. 20/ The USSR plans to increase production of synthetic rubber at an average annual rate of 12 to 13 percent during 1961-80 to an estimated level of 3.5 million to 4.0 million tons in 1980.* By 1980, according to a Soviet authority, 22/ synthetic rubber is scheduled to account for 90 to 95 percent of the total rubber required for production of motor vehicle tires and rubber technical articles.

Several of the European Satellites also have indicated plans for substantial increases in production of synthetic rubber. Poland plans to produce 100,000 tons of synthetic rubber by 1970, 23/ or more than twice the planned output for 1965. Bulgaria plans a threefold increase in production between 1965 and 1980, with output in the terminal year scheduled to be 120,000 tons. 24/

Plans for production of stereo-regular rubber have been outlined by a few Satellites and appear in the offing for some others. The Rumanians have stated that they will begin construction of a polyisoprene

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plant by 1965 in order to eliminate the importation of natural rubber. 25/ By 1968 the Poles plan to be producing 25,000 tons of polyisoprene annually. 26/ In addition, both Czechoslovakia and East Germany have expressed interest in polyisoprene and may announce definite plans for production in the near future.

There is little information on long-range plans in the Communist Far East beyond the goal of 15,000 to 20,000 tons of rubber set by North Korea for 1967, an amount that presumably will satisfy North Korean domestic requirements.

APPENDIX A

SYNTHETIC RUBBER PLANTS IN THE SINO-SOVIET BLOC

Country	Location	Product	Remarks
USSR	Irkutsk area		Under construction, presumably in Irkutskaya Oblast, possibly in the Angarsk-Usol'ye area. Production probably will include chloroprene rubber.*
	Kazan'	Sodium polymerized butadiene rubber (SKB)	
	Krasnoyarsk	SKB	Production of oil-extended rubber was planned by the end of 1961. Plant capacity is scheduled to be nearly double, possibly by 1965.
	Omsk		Under construction for 10 years; not in operation by the end of 1961.
	Stavropol'**	Copolymer rubber based on butane	Initial production of latex was reported in May 1961 and of rubber in June 1961.

* An oil-resistant rubber made from acetylene and hydrochloric acid.
** Referred to either as the Stavropol' Synthetic Rubber Plant or as the Kuybyshev Synthetic Rubber Plant.

Country	Location	Product	Remarks
USSR (Continued)	Sterlitamak	Oil-extended copolymer rubber based on butane	Under construction. Initial production of rubber was reported in April 1960. In 1961, production of butadiene (sufficient to meet one-third of the plant's requirements) began. Polyisoprene rubber is planned for production in 1963.
	Sumgait	Oil-extended copolymer rubber based on synthetic alcohol and copolymer rubber based on butane	Production is scheduled to increase about 200 percent in 1959-65. Future products are to include butyl rubber and polyisobutylene. Additional butadiene capacity was installed in 1961.
	Temir Tau		Operations reportedly began in 1961, and the first butadiene was produced in June 1961. Future production may include chloroprene rubber.
	Volzhskiy		Planned for construction as a multipurpose chemical combine, possibly including production of synthetic rubber.
	Voronezh	SKB, oil-extended copolymer latex, experimental production of polyisoprene rubber	

Country	Location	Product	Remarks
USSR (Continued)	Yaroslavl'	SKB, nitrile rubber, butyl rubber, oil-extended, frost-resistant rubber, and experimental production of polybutadiene	Production of synthetic rubber is planned to double during 1959-65. Initial production of polybutadiene was reported in December 1961.
	Yefremov	SKB, polyisobutylene, butyl rubber, isoprene	Production of bromobutyl rubber is planned.
	Yerevan	Chloroprene rubber and latex	Production is scheduled to double in 1959-65. The plant is converting from calcium carbide to natural gas as the raw material for producing acetylene.
Bulgaria	Burgas (planned)	Styrene-butadiene copolymer (SBR) (planned)	Construction planned with assistance from the USSR, with output to be 30,000 tons annually.
Czechoslovakia	Otrokovice	Chloroprene	Svit Plant, producing on pilot-plant scale (1,000 tons annually)
	Kralupy nad Vltavou	SBR (planned)	Under construction. The first stage is to be completed in 1963, the second stage in 1965. Production of the stereo-regular type is planned.
	Sala nad Vahom (planned)	Chloroprene (planned)	

Country	Location	Product	Remarks
East Germany	Schkopau	SBR, nitrile rubber, latices	Oldest Satellite producer of synthetic rubber; output based on calcium carbide.
Poland	Oswiecim	Styrene-butadiene	Built with assistance from the USSR and East Germany. Operations began in 1959. Output of styrene-butadiene in 1961 was 31,000 tons, and planned expansion and modernization are to produce 45,000 tons of styrene-butadiene in 1965.
	Plock	Polyisoprene (planned)	Plant to be constructed as part of a major petrochemical complex. Production during 1965-68 is scheduled to be 25,000 tons per year.
Rumania		Butyl rubber and polyisoprene (planned)	Construction planned to begin during the 1960-65 period.
	Onesti-Borzesti	Styrene-butadiene (planned)	Under construction. Completion is planned for 1965 with a capacity of 50,000 tons. The first stage (25,000 tons) is to be operating in 1962.
Communist China	Lan-chou	SBR	Production began in 1960 but may have been suspended because of a general economic decline and the withdrawal of Soviet technicians.

Country	Location	Product	Remarks
Communist China (Continued)	Kirin	Chloroprene (planned)	Planned to be in full production by 1962, but there is no evidence that the plant was completed.
North Korea			Planned to produce 15,000 to 20,000 tons of synthetic rubber by 1967.

APPENDIX B

METHODOLOGY

The estimates of consumption of rubber by the Bloc that were made for 1955, 1961, and 1965 (requirements) have involved the use of some official statistics as well as some assumptions. Because relatively reliable information is available on the USSR, which accounts for more than one-half of the annual consumption of rubber by the Bloc, and on Poland, which is one of the major consumers of rubber in the European Satellites, the range of possible error in these estimates probably is not large. In estimating the quantity of rubber consumed by each country, the various end-uses were considered under two broad categories -- transportation and nontransportation.

Estimates of the quantity of rubber used in the transportation sector were based on the assumption that an average motor vehicle tire uses about 22 kilograms (kg) of rubber (20 kg of which are new rubber). This factor was derived from both Soviet 27/ and Chinese sources. 28/ By applying this factor to the estimated production of motor vehicle tires in each country, the estimates for consumption of rubber by transportation were obtained. Thus, for example, in 1955 the USSR reportedly produced 10,190,000 tires, or 224,000 tons of rubber consumed. Inasmuch as the USSR has indicated that tires account for about 60 percent of all rubber consumed, 29/ it was possible to estimate that the total consumption of rubber in 1955 was about 375,000 tons and that consumption for nontransportation purposes was about 150,000 tons. In Poland the total consumption of rubber for 1960 and the requirements for 1965 were reported by a reliable source. In most of the other European Satellites an attempt was made to estimate individually consumption of rubber by transportation and for nontransportation purposes, although the assumption throughout was that the total availability and consumption of rubber were about equal, with little or no buildup in stockpiles from year to year. Apparent exceptions were Poland, Czechoslovakia, and Rumania in 1960.

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